ALLENDALE PRODUCE (PWS #3140212)
SOURCE WATER ASSESSMENT FINAL REPORT

March 6, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the federal Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. The assessment for your particular system is based on a land use inventory of the designated source water area, sensitivity factors associated with each well, and characteristics of the aquifer that supplies your community with drinking water.

This report, *Source Water Assessment for the Allendale Produce, located near Wilder, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within those boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Allendale Produce (PWS #3140212) drinking water system consists of a single well. This well rated an overall high susceptibility to inorganic compounds (IOCs), volatile organic compounds (VOCs), synthetic organic compounds (SOCs) and microbial contaminants. This rating is due, in large part, to the predominant land use within the delineated drinking water capture zone, which is irrigated agriculture. The Idaho Department of Environmental Quality (DEQ) considers these regions to be vulnerable to the leaching effects of agricultural chemicals once they are applied on the surrounding farmland. Allendale Produce also resides in an area of high county level agricultural chemical usage, including nitrogen fertilizers, pesticides, and herbicides. Additionally, DEQ designated Group 1 Priority Areas for nitrates, arsenic, and the herbicide alachlor encompass the drinking water capture zone. The system may be susceptible to these compounds, since they are quite prevalent in the region.

The Allendale Produce drinking water system has not had any severe water chemistry problems in its history. The SOC Dacthal, which is an herbicide commonly used on onions and other types of vegetables, was recently detected in the distribution system. The detection of Dacthal in the drinking water supply is of minimal concern as the health effects on humans are believed to be extremely minute (Extension Toxicological Network, 1996). A group of VOCs collectively known as trihalomethanes have also been detected in the drinking water supply. Again, the presence of trihalomethanes is of little concern, since these compounds are the result of chlorinated disinfection practices employed by the Allendale Produce water system.

The IOCs arsenic, fluoride, and nitrate have also been detected in the drinking water supply. Nitrate levels have been quite elevated, averaging 6.6 parts per million (ppm) since 1997. The maximum contaminant level (MCL) for nitrate is 10.0 ppm. The most recent routine test for arsenic revealed a concentration of 65 parts per billion (ppb). The previous arsenic level in March of 1997 was 51 ppb. Both of these test results constitute a MCL violation of the arsenic standard, which was 50 ppb. The MCL for arsenic has recently been lowered to an even more stringent level, from 50 ppb to 10 ppb (October 31, 2001) by the EPA, requiring all water systems to comply with this new standard by 2006. The Allendale Produce water system will need to implement new engineering controls to reduce these arsenic concentrations, or seek an alternative supply of drinking water in order to avoid future MCL violations.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For Allendale Produce, drinking water protection activities should first focus on continued maintenance of the sanitary seal and distribution system. Actions should also be taken to keep a 50-foot radius circle clear around the wellhead. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use. The well's pit location should also be upgraded to prevent contamination from the flooding or pooling of surface water.

Any spills occurring on Highway 19 should be monitored and dealt with expeditiously. Additionally, there should be a focus on implementation of practices aimed at reducing the leaching of agricultural chemicals within the designated source water area. The water system may want to cooperate with farmers in the vicinity to encourage the use of specific best management practices (BMPs). Furthermore, since a large portion of the ground water capture zone is outside the direct jurisdiction of Allendale Produce, the creation of partnerships with state and local agencies and industry groups are critical to the success of drinking water protection.

The water system may choose to take a proactive approach in preparing for the new arsenic standard. The EPA expects all water systems to comply with the new MCL of 10 ppb by 2006. Recent documentation posted on the EPA website (www.epa.gov) indicates that the EPA intends to provide up to $20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the new arsenic standard. The EPA has also indicated that they plan to provide monetary assistance to small water systems to implement and maintain new engineering controls.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan, especially since the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, and the importance of water conservation to name but a few.

There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. In addition, because a major transportation corridor (Highway 19) passes through the delineation, the Idaho Department of Transportation should be involved in any protection measures. Drinking water protection practices dealing with agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Canyon Soil Conservation District, and the Natural Resources Conservation Service.

A community should incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, water conservation, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of DEQ at 373-0550 or the Idaho Rural Water Association at 1-800-962-3257.

SOURCE WATER ASSESSMENT FOR ALLENDALE PRODUCE, WILDER, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are contained in this report (Attachment A, pages 18-21). The list of significant potential contaminant source categories and their rankings used to develop the assessment is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess each drinking water source in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act Amendments of 1996. This assessment is based on a land use inventory of the delineated source water area, sensitivity factors associated with each well, and aquifer characteristics. Since there are over 2,900 public water sources in Idaho, there is limited time and resources available to accomplish the assessments. All of these assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

Allendale Produce has a non-community, non-transient public drinking water system serving approximately 47 people that is located in Canyon County at the intersection of Peckham Road and Allendale Road, near Wilder, Idaho (Figure 1, page 19). Residents receive their water from a single well source.

The Allendale Produce water system has had no severe water chemistry problems in its history. However, recently, both VOCs and SOCs were detected in the drinking water supply. A broad VOC category, collectively known as trihalomethanes were detected in August of 2000. Their combined total trihalomethane concentration was 0.007 ppm, which is below the MCL of 0.1 ppm. These compounds are generally the result of chlorinated disinfection practices. At high concentrations, they have been known to cause cancer in laboratory animals, but at the level detected in the distribution system are of little concern.

In March of 1997, the herbicide (SOC) Dacthal was also detected in the distribution system. Dacthal is commonly used on onions and other vegetable crops, and may have resulted from its application on a nearby field. Dacthal is classified as a toxicity class IV compound by the EPA, which means that it is practically nontoxic to humans (Extension Toxicological Network, 1996).

The IOCs arsenic, fluoride, and nitrate have also been detected in the drinking water supply. Nitrate levels have been quite high, averaging 6.6 ppm since 1997. The MCL for nitrate is 10.0 ppm. The last routine test for arsenic revealed a concentration of 65 ppb. The previous arsenic test result in March of 1997 was 51 ppb. Both of these test results constitute a MCL violation of the arsenic standard, which was 50 ppb. The MCL for arsenic has recently been lowered to an even more stringent level, from 50 ppb to 10 ppb (October 31, 2001) by the EPA, requiring all water systems to comply with this new standard by 2006. The Allendale Produce water system will need to implement new engineering controls to reduce these arsenic concentrations, or seek an alternative supply of drinking water in order to avoid future MCL violations.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (regions indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. DEQ contracted with BARR Engineering to perform the delineations using a combination of MODFLOW and a refined analytical element computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Boise Valley aquifer. The computer model used site specific data, assimilated by BARR Engineering from a variety of sources including area well logs, the Treasure Valley Hydrologic Project, and hydrogeologic reports on the Boise Valley and Mountain Home Plateau aquifers (detailed below in Section 3).

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with these possible contamination sources, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in October and November of 2001. The first phase involved identifying and documenting potential contaminant sources within the Allendale Produce source water assessment area (Figure 2, page 20) through the use of computer databases and Geographic Information System maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the system representative, Carey Inouye, to validate the sources identified in phase one and to add any other potential sources in the area.

The delineated source water area contains few potential sources of contamination. The greatest source of concern is Highway 19, which passes directly through all three regions of the delineated drinking water capture zone. Because Highway 19 serves as an important transportation thoroughfare for the area, it was considered a possible source of contamination for all classes of pollutants. The only other source of concern is a small tank farm located in the 10-year TOT zone. These tanks contain gasoline, diesel fuel, and agricultural chemicals. Therefore, the tank farm was regarded as a possible source of VOC and SOC contaminants. These sources, along with the class of pollutants stored on site can be found in Table 1 (page 21).

Section 3. Hydrologic Conditions of the Treasure Valley and Mountain Home Plateau

Treasure Valley Hydrologic Project Information (Petrich and Urban, 1996; Neely and Crockett, 1998; Petrich et al., 1999)

The "Treasure Valley" is a geopolitical region that includes the lower Boise River sub-basin. The lower Boise River sub-basin begins where the Boise River exits the mountains near the Lucky Peak Reservoir. From Lucky Peak Dam the lower Boise River flows about 64 (river) miles northwestward through the Treasure Valley to its confluence with the Snake River. The Treasure Valley Hydrologic Project area encompasses the lower Boise River area, and extends south to the Snake River. The southern area is included in the study area because of ground water flow from the Lower Boise River basin south toward the Snake River.

Significant amounts of desert area were converted to flood irrigated agriculture beginning in the 1860s. Irrigation led to increases in shallow ground water levels in some regions. These shallow ground water levels provided an inexpensive and readily obtainable source of water supply that is used extensively throughout the valley. Much of the population growth in the Treasure Valley has been occurring in previously flood-irrigated agricultural areas, resulting in increased pumpage and a reduction in local aquifer recharge. In addition, irrigation in some areas has become more efficient, reducing the amount of irrigation-related infiltration. Decreasing aquifer recharge and increasing pumpage is thought to be contributing to the decline of ground water levels in some areas.

The Treasure Valley experiences a temperate and arid-to-semiarid climate. Average high temperatures range from about 90°F in summer to 36°F in winter; low temperatures range from about 20°F in winter to about 56°F in summer. The average precipitation ranges from about 8 to 14 inches throughout most of the valley, most of which falls during the colder months in the form of snow in higher elevations and rain in the low-lying valleys.

Major surface water bodies include the Boise River, Lake Lowell, and Lucky Peak Reservoir. The primary source of surface water in the Treasure Valley is the high elevation area in the Boise River basin upstream of Lucky Peak Dam. Much of the spring runoff from the snow pack in high elevation areas is stored in three reservoirs: Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir.

Regional cropland is irrigated primarily with surface water through an extensive network of reservoirs and canals. The first canals were constructed in the 1860's; there are now over 1,100 miles of major and intermediate canals in the Treasure Valley, the majority of which are owned and maintained by canal companies and irrigation districts. Primary sources of irrigation water in the Treasure Valley include the Boise, Snake, and Payette Rivers.

Hydrogeology (from Petrich et al., 1999)

The lower Boise River sub-basin (Treasure Valley) is located within the northwest-trending topographic depression known as the western Snake River Plain. The western Snake River Plain is a relatively flat lowland separating Cretaceous granitic mountains of west-central Idaho from the granitic/volcanic Owyhee mountains in southwestern Idaho. The western Snake River Plain extends from about Twin Falls, Idaho northwestward to Vale, Oregon. The Snake River Plain is about 30 miles wide in the section containing the lower Boise River.

Historically, sediments originating from the surrounding mountains began accumulating on top of thick, basal basalts. Rifting and continued subsidence maintained the lowland topography, leading to the additional accumulation of water and sediments (Othberg, 1994). Basin infilling by sediments and basalt occurred from the late Miocene through the late Pliocene (Othberg, 1994). Incision caused by flowing water in major drainages (e.g., Snake and Boise Rivers) began in the late Pliocene or early Pleistocene, although deposition of coarse sediments continued during Quaternary glaciations (Othberg, 1994).

Several Quaternary basalt flows have been described in the western Snake River Plain, and have been assigned to the upper Snake River Group (Malde, 1991; Malde and Powers, 1962). Lava flowed across portions of the ancestral Snake River Valley (Malde, 1991) in an area that is now south of the Boise River. The Snake River then changed course, incising at its present location along the southern margin of the basalt flows. More recent eruptions (from Kuna Butte and other local sources) spilled lava into the canyon south of Melba. The Snake River has since incised this basalt (Malde, 1991).

The general stratigraphy of the western Snake River Plain consists of (from top to bottom) a thick layer of sedimentary deposits underlain by a thick series of basalt flows, which in turn are underlain by older, tuffaceous sediments and basalt (Malde, 1991; Clemens, 1993). The upper thick zone of sediments (up to approximately 6,000 feet thick) distinguishes the western Snake River Plain from the eastern Snake River Plain, in which the upper section is primarily Quaternary basalt (Wood and Anderson, 1981).

The uppermost sediments and basalt belong to the Pleistocene-age Snake River Group. The Snake River Group consists of terrace sediments, Quaternary alluvium, and Pleistocene basalt flows (Wood and Anderson, 1981). Snake River Group sediments and basalts cover much of the project area (Othberg and Stanford, 1992).

The Snake River Group overlies the Idaho Group sediments. The Idaho Group sediments can be divided into two general parts (Wood and Anderson, 1981). The lower Idaho Group contains sediments described as lake and stream deposits of buff white, brown, and gray sand, silt, clay, diatomite, numerous thin beds of vitric ash, and some basaltic tuffs. The upper part of the lower Idaho Group also contains some local, thin, basalt flows. The upper Idaho Group consists of sands, claystones, and siltstones, but differs from the lower Idaho Group in that it contains a greater percentage of coarser-grained materials. The upper Idaho Group sediments are associated with a fluvial/deltaic/lacustrine depositional environment; the lower Idaho Group sediments were deposited in more of a lacustrine/deltaic environment (Wood, 1994).

Wood (1994) identified a buried lacustrine delta within the Idaho Group sediments in the Nampa-Caldwell area. The location of the delta in the middle of the western Snake River Plain suggests that the eastern part of the Boise River basin was delta plain and flood plain at the time of deposition, while the western part was a deep lake environment. The delta probably prograded northwestward into a lake basin 830 feet deep, based upon high resolution seismic reflection data and resistivity log interpretations. The delta-plain and front sediments were shown to be mostly fine-grained, well-sorted sand with thin layers of mud (Wood, 1994). The northwest trend of the delta indicates a sediment source to the southeast, such as where the Snake River flows today (Wood, 1994).

A substantial, laterally extensive layer of clay is found at depths of 300 to 700 feet below ground surface. The clay is important because it represents, in some areas, a significant aquitard separating shallow overlying aquifers from deeper zones. The clay, often described in well logs as having a blue or gray color, has been observed as far west as Parma, and as far east as Boise (although the clay is not found in the extreme eastern portions of the Treasure Valley). The clay varies from a few feet to a few hundred feet in thickness. Although significant layers of clay are present throughout the Idaho Group sediments, individual clay units are not necessarily continuous over large areas. Also, the top of the clay can vary in elevation by up to approximately 200 feet in some locations, such as in an area west of Lake Lowell. In general, sediments above the "blue clay" are coarser-grained than the interbedded sands, silts, and clays underlying the "blue clay."

The top of the upper Idaho Group is marked in several parts of the Treasure Valley by a widespread fluvial gravel deposit known as the Tenmile gravels. Tenmile gravels contain rounded granitic rocks and felsic porphyries originating from the Idaho Batholith to the north and northeast. The Tenmile gravels range up to 500 feet in thickness along the Tenmile Ridge south of Boise, but are less than 50 feet thick in the Nampa-Caldwell area (Wood and Anderson, 1981).

Aquifer Systems and Hydrogeologic Characteristics of the Boise Valley and Mountain Home Plateau

Ground water for municipal, industrial, rural domestic, and irrigation uses in the Treasure Valley is drawn almost entirely from Snake River Group and Idaho Group aquifers. Many domestic wells draw water from shallow aquifers, such as those in the Snake River Group deposits. Larger production wells (for municipal and agricultural uses) draw water from the deeper Idaho Group sediments.

Aquifers contained in the Snake River and Idaho Group sediments comprise shallow and regional ground water flow systems. Shallow aquifers contained in Snake River Group sediments and basalts may belong to local flow systems. Most local flow system recharge stems from irrigation infiltration and channel (e.g., streams or canals) losses. Discharge from shallow, local flow systems often is to local drains or streams. The time from recharge to discharge in shallow flow systems (residence times) probably ranges from days to tens of years.

In contrast, regional ground water flow systems extend much deeper than local flow systems. The Treasure Valley regional flow system begins in the eastern part of the valley, as indicated by downward hydraulic gradients in the Boise Fan sediments (Squires et al., 1992). Some water also enters the regional flow system as underflow from the Boise Foothills in the northeastern part of the valley. The regional flow system is thought to discharge primarily to the Boise and Snake Rivers in the western and southwestern parts of the valley.

Aquifer material characteristics, material heterogeneity, and structural controls influence Treasure Valley ground water flow. Coarse-grained materials (e.g., sand and gravel) in upper zones are more capable of transmitting ground water than fine-grained sediments (e.g., silt and clay). Clay and silt in the Snake River sediments can restrict vertical and/or horizontal ground water movement. Perched aquifers are created when fine-grained lenses impede downward vertical flow. A distinctive clay layer, sometimes referred to as "blue clay," is present over large portions of the valley. The clay is absent in the easternmost portions of the lower Boise River Basin, but can reach a thickness of more than 200 feet toward the central and western portions of the basin.

Sequences of interbedded sand, silt, and clay, such as the Deer Flat Surface and the upper portion of the Glenns Ferry Formation of the upper Idaho Group in the Nampa-Caldwell area, are the major water-producing aquifers in a large part of Canyon County (Anderson and Wood, 1981). The coarse-grained sediments in this zone produce water in excess of 2,000 gallons per minute (gpm).

The ground water system underlying the western part of the area is recharged with water from the Boise River. This recharge results from leakage from the many irrigation canals, laterals, and ditches that cross the area and from downward percolation of applied irrigation water. Leakage directly from the channel of the Boise River between Lucky Peak and Barber Dams also recharges the ground water system.

The lower sand and gravel unit underlies the western portion of the area, south of Kuna. It consists of lenticular beds of poorly sorted gravel and sand with lesser amounts of silt and clay. The sediments were derived from the mountains to the north and deposited on a rolling topography by the ancient Boise River and tributary stream. These sediments are believed to provide hydraulic connection for some ground water recharge from the present Boise River. Local artesian conditions are present.

The basalt unit consists of a thick sequence of lava flows deposited from a chain of volcanoes, which paralleled the Snake River during Middle Pleistocene time. These flows filled the then existing valleys and low areas to approximately 3,000 feet elevation. The contacts between flows are vesicular or porous and broken. Cinder beds and clay lenses were deposited between many flows. The thickness of the unit varies from as little of 40 feet to as much as 600 feet. Wells commonly yield more than 2,000 gpm.

Torrential streams issuing from the mountains to the north during Upper Pleistocene time deposited the upper sand and gravel unit. The unit ranges from silt to cobble-size granite, with small amounts of basalt and metamorphic rocks. Individual beds are very discontinuous. The thickness of the unit varies widely, but is believed to be over 900 feet. The well production from this aquifer varies from 1,000 to 3,000 gpm.

Recharge to the aquifers is mainly derived from the Boise River and the New York Canal and associated irrigation. It is not believed that a significant quantity of recharge is derived from precipitation either on the mountainous regions or the plateau. Regional ground water flow is from northeast to southwest.

The delineated source water assessment area for the Allendale Produce can best be described as an eastward trending corridor approximately two miles long and one-half mile wide (Figure 2, page 20). The actual data used by BARR Engineering in determining the source water zones of contribution are available from DEQ upon request.

Section 4. Susceptibility Analysis

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment B (pages 22-23) contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: 1) the surface soil composition, 2) the material in the vadose zone (region between the land surface and the water table), 3) the depth to first ground water, and 4) the presence of a 50-foot thick impermeable zone above the production interval of the well. Slowly draining fine-grained soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel.

For the Allendale Produce water system, regional soil information indicates the presence of moderate to well draining surface soils within the delineated area. These soils, in general, provide less protection to the aquifer by allowing for a more rapid downward progress of contaminants in the unlikely event of a spill or release in the vicinity of Allendale Produce.

Hydrologic sensitivity is high for the well (Table 2, page 12). The elevated rating is a result of these general soil properties, in addition to the fact that the DEQ was unable to obtain an applicable well log for the Allendale Produce well. Well logs contain valuable information regarding below ground hydrologic conditions. Because this data was lacking, the high hydrologic sensitivity ranking is somewhat conservative.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have a better buffering capacity. In addition, if the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less probable. Also, if the wellhead is protected from surface flooding and is outside the 100-year floodplain, then the likelihood of contamination from surface events is reduced.

According to the 1996 Sanitary Survey performed by the Southwest District Health Department, the well was constructed in around 1945 with a 6-inch casing. However, a well log was not available for the Allendale Produce well. Therefore, information concerning the depth of the casing, condition of the annular seal, production intervals of the well, and the static depth of ground water could not be determined. The Sanitary Survey did indicate that the well was located in a pit below the floor of the processing building for Allendale Produce. Accordingly, the well is vulnerable to surface flooding events. This deficiency could be corrected, if a sump pump could be installed in this pit, with an exit drain terminating at least 30 feet from the wellhead. So, the final well construction rating was high for the Allendale Produce well (Table 2, page 12).

Potential Contaminant Source and Land Use

In terms of the potential contaminant source/land use score, the well rated high for IOCs (i.e. nitrates, arsenic), moderate for VOCs (i.e. petroleum products) and SOCs (i.e. pesticides), and a low rating for microbial contaminants (i.e. bacteria). These ratings can be attributed, in large part, to the predominant land use within the delineated drinking water capture zone, which is irrigated agriculture. DEQ considers these regions to be vulnerable to the leaching effects of agricultural chemicals once they are applied on the surrounding farmland. Allendale Produce resides in an area of high county level agricultural chemical usage, including nitrogen fertilizers and pesticides/herbicides. Additionally, DEQ designated Group 1 Priority Areas for nitrates, arsenic, and the herbicide alachlor encompass the drinking water capture zone. The system may be susceptible to these compounds, since they are quite prevalent in the region. Also contributing to these rankings are the potential contaminant sources listed in Table 1 (page 21).

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a repeat detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, potential contaminant sources within 50 feet of a wellhead will lead to an automatically high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) and the presence of agricultural land contribute greatly to the overall ranking.

The Allendale Produce water system may have rated a lower overall susceptibility if an applicable well log could have been incorporated into the susceptibility analysis. Instead, the system rated a high overall susceptibility to all classes of contaminants (Table 2).

Table 2. Summary of the Allendale Produce Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	H	H	M	M	L	H	H	H	H	H

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

A high hydrologic sensitivity and high system construction combined to give the well a high overall rating for all contaminants, even though few potential contaminant sources exist in the 3-year TOT zone. Both VOCs and SOCs have recently been detected in routine water samples collected from the system. The new arsenic standard may also require the water system to install new treatment techniques to avoid a future MCL violation. In addition, the delineated source water area does reside in an area of elevated agricultural chemical use. DEQ considers these regions to potentially be vulnerable to drinking water contamination because of the leaching of pollutants from surrounding agricultural practices. The system also resides within DEQ designated Group 1 Priority Areas for nitrates, arsenic, and the pesticide alachlor. The well may be vulnerable to these compounds, because they are quite prevalent in the region.

Section 5. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For Allendale Produce, drinking water protection activities should first focus on continued maintenance of the sanitary seal and distribution system. Actions should also be taken to keep a 50-foot radius circle clear around the wellhead. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

Any spills occurring on Highway 19 should be monitored and dealt with expeditiously. Additionally, there should be a focus on implementation of practices aimed at reducing the leaching of agricultural chemicals within the designated source water area. The water system may want to cooperate with farmers in the vicinity to encourage the use of specific BMPs. Furthermore, since a large portion of the ground water capture zone is outside the direct jurisdiction of Allendale Produce, the creation of partnerships with state and local agencies and industry groups are critical to the success of drinking water protection.

The water system may choose to take a proactive approach in preparing for the new arsenic standard. The EPA expects all water systems to comply with the new MCL of 10 ppb by 2006. Recent documentation posted on the EPA website (www.epa.gov) indicates that the EPA intends to provide up to $20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the new arsenic standard. The EPA has also indicated that they plan to provide monetary assistance to small water systems to implement and maintain new engineering controls.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan, especially since the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, and the importance of water conservation to name but a few.

There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. In addition, because a major transportation corridor (Highway 19) passes through the delineation, the Idaho Department of Transportation should be involved in any protection measures. Drinking water protection practices dealing with agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Canyon Soil Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of DEQ or the Idaho Rural

Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Boise Regional DEQ Office	(208) 373-0550
State DEQ Office	(208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Anderson, J.E. and Wood, S.H., 1981. Geological, Hydrological Geochemical and Geophysical Investigations of the Nampa-Caldwell and Adjacent Areas, Southwestern Idaho. Chapter 3, Geohydrology, In: Mitchell, J. C., ed., Geothermal Investigations in Idaho, Part 11: Idaho Department of Water Resources, Water Information Bulletin 30: p. 33-42.

Clemens, D.M., 1993. Volcanic stratigraphy and tectonic development, Western Snake River Plain, Idaho. M.S. Thesis, Arizona State University.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Environmental Protection Agency, 2001. Technical Fact Sheet: Final Rule for Arsenic in Drinking Water. EPA Office of Water; 6 pp.

Extension Toxicological Network (EXTOXNET), 1996. Pesticide Information Profile: DCPA, Chlorthal, Chlorthal-dimethyl. 4 pp.

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Malde, H.E., 1991. Quaternary geology and structural history of the Snake River Plain, Idaho and Oregon. In: The Geology of North America, Quaternary Nonglacial Geology: Conterminous U.S., Vol. K-2, 252-281 pp.

Malde, H.E. and Powers, H.A., 1962. Upper Cenozoic stratigraphy of Western Snake River Plain. Geological Society of America Bulletin, 73: 1197-1220.

Neely, K.W. and J.K. Crockett, 1998. "Ground Water Quality Characterization and Initial Trend Analyses for the Treasure Valley Shallow and Deep Hydrogeologic Subareas," Idaho Department of Water Resources, Water Information Bulletin No. 50, Part 3.

Norton, M.A., W. Ondrechen, and J.L. Baggs. 1982. *Ground Water Investigation of the Mountain Home Plateau, Idaho*. Idaho Department of Water Resources. Open File Report August 1982.

Othberg, K.L., 1994. Geology and geomorphology of the Boise Valley and adjoining areas, western Snake River Plain, Idaho. Idaho Geological Survey Bulletin 29: 54 pp.

Othberg, K.L. and Stanford, L., 1992. Geologic map of the Boise Valley and adjoining area, Western Snake River Plain, Idaho. Idaho Geological Survey.

Petrich, C.R. and S.M. Urban, 1996. "Treasure Valley Hydrologic Project Background – Draft," September, 1996.

Petrich, C.R. and J.H. Hutchings (IWRRI), S.M. Urban and R.A. Carlson (IDWR), 1999. "Progress Report on the Characterization of Treasure Valley Ground Water Resources – Draft," prepared for and in cooperation with the Idaho Department of Water Resources, June 30, 1999.

Ralston, D.R. and S.L. Chapman. 1968. *Ground Water Resources in the Mountain Home Area, Elmore County, Idaho*. Idaho Department of Reclamation. Water Information Bulletin #4. 63 pages.

Ralston, D.R. and S.L. Chapman. 1970. *Ground Water Resources of Southern Ada County and Western Elmore County, Idaho*. Idaho Department of Reclamation. Water Information Bulletin #15. 52 pages.

Squires, E., Wood, S.H. and Osiensky, J.L., 1992. Hydrogeologic Framework of the Boise Aquifer System, Ada County, Idaho, Research Technical Completion Report, Idaho Water Resources Research Institute, University of Idaho. 114 pp.

Wood, S.H., 1994. Seismic expression and geological significance of a lacustrine delta in Neogene deposits of the Western Snake River Plain, Idaho. AAPG Bulletin, 1(January): p. 102-121.

Wood, S.H. and Anderson, J.E., 1981. Part 11: Geological, hydrological, and geochemical and Geophysical investigations of the Nampa-Caldwell and adjacent areas, southwestern Idaho. In: J.C. Mitchell (Editor), Geothermal investigations in Idaho. Idaho Department of Water Resources.

Wuolo, R.W., J. Wittman, and D.M. Reynolds, 2001. "Summary Report: Delineation of Public Drinking Water Sources for the Source Water Assessment Program: Boise Valley and Mountain Home Plateau," BARR, Minneapolis, August 2001.

Young, H.W. 1977. *Reconnaissance of Ground Water Resources in the Mountain Home Plateau Area, Southwest Idaho*. U.S. Geological Survey. Water Resources Investigations 77-108, Open File Report. 40 pages.

Attachment A

Delineation Figures and Potential Contaminant Source Table for Allendale Produce

FIGURE 1: Geographic Location of Allendale Produce

PWS# 3140212

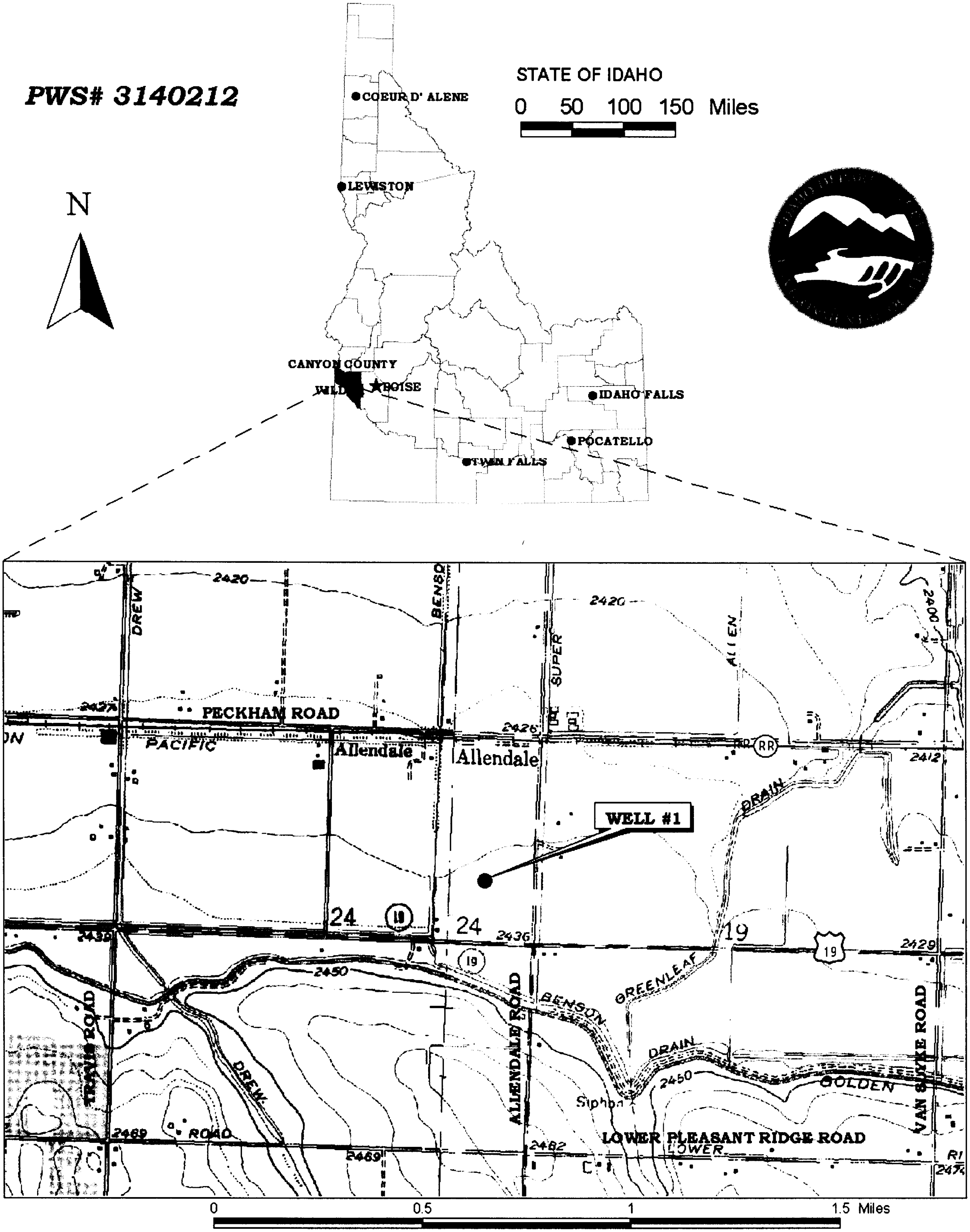
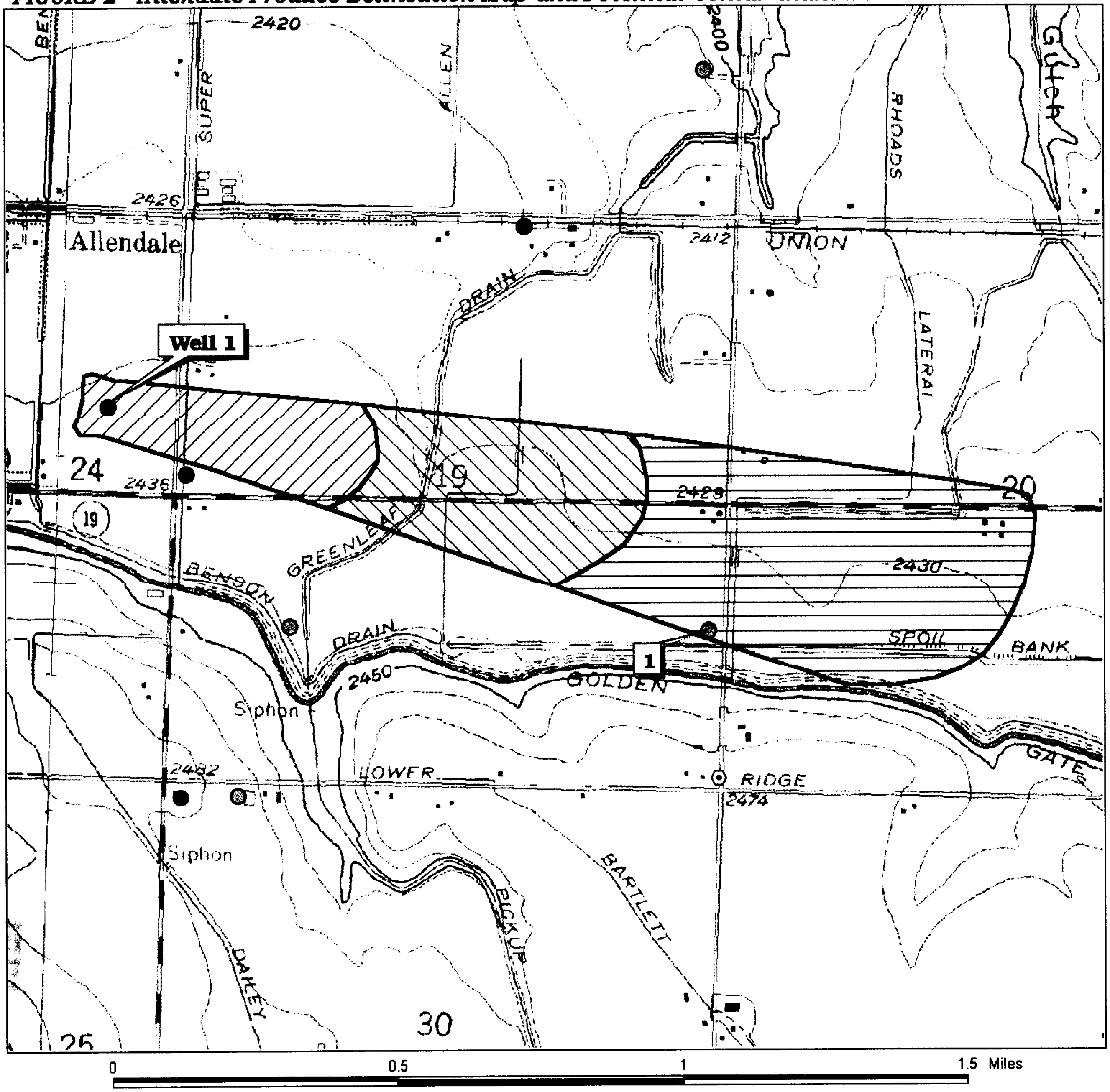


FIGURE 2 - Allendale Produce Delineation Map and Potential Conta .nant Source Locations



LEGEND

Time of Travel Zones
- 1B (3 yr TOT)
- 2 (6 yr TOT)
- 3 (10 yr TOT)
- Wellhead
- Enhanced Inventory
- Toxic Release Inventory
- CERCLIS Site
- RICRIS Site
- Business Mailing List
- Dairy
- LUST Site
- NPDES Site
- Mine
- AST

UST Site
- Closed
- Open

- Recharge Point
- SARA Title III Site (EPCRA)
- Injection Well
- Group1 Site
- Cyanide Site
- Landfill
- Wastewater Land App.Site

N

PWS# 3140212

WELL# 1

Table 1. Allendale Produce Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
	Highway 19	0-3	GIS Map	IOC, VOC, SOC, Microbes
1	AST-diesel fuel, gasoline, agricultural chemicals	6-10	Database Search	VOC, SOC

[1] **Find Source Description definitions on page 15**

[2] **TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**

[3] **IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

NOTE: The site number in this table corresponds to Figure 2, page 20.

Attachment B

Allendale Produce
Susceptibility Analysis
Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report | Public Water System Name : ALLENDALE PRODUCE | Public Water System Number 3140212 | Well# : WELL 1 | 1/25/02 9:53:13 AM

1. System Construction		SCORE			
Drill Date	circa 1945				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	1996			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	NO	1			
	Total System Construction Score	5			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	2	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	YES	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A	4	4	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	5	1	1	
4 Points Maximum		4	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B	12	7	9	6
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II	3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	0	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III	2	3	2	0
Cumulative Potential Contaminant / Land Use Score		21	16	17	8
4. Final Susceptibility Source Score		15	14	14	14
5. Final Well Ranking		High	High	High	High